

Lab Exercise 4B Single and Double Replacement Reactions

The purpose of this lab exercise is to predict and analyze single and double replacement reactions in preparation for an evaluation of these reaction types as part of Investigation 4.4. Complete the Prediction (including possible diagnostic tests) and Analysis (including reaction types) in your investigation report.

Problem

What reaction products are formed when the following substances are mixed?

- Aqueous chlorine is added to a potassium iodide solution.
- Solutions of magnesium chloride and sodium hydroxide are mixed.
- Solutions of aluminum nitrate and sodium phosphate are mixed.
- Nickel metal is added to hydrochloric acid.
- Sodium hydroxide solution is added to a chromium(III) chloride solution.
- Lithium metal is placed in water.
- A clean cobalt strip is placed in a silver nitrate solution.
- Nitric acid is added to an ammonium acetate solution.

Experimental Design

Diagnostic test information such as evidence of chemical reactions (Table 4.3, page 134), ion colors and solubilities (reference tables, inside back cover), and specific tests for products (Appendix C, page 598) are predicted, for convenience, along with the balanced chemical equations. The general plan is to observe the substances before and after mixing and conduct the appropriate diagnostic tests.

Evidence

SINGLE AND DOUBLE REPLACEMENT REACTIONS

Reaction

Observations

- | Reaction | Observations |
|----------|--|
| (a) | <ul style="list-style-type: none">The colorless solutions produced a yellow-brown color when mixed.A violet color appeared in the chlorinated hydrocarbon layer. |
| (b) | <ul style="list-style-type: none">The colorless solutions produced a white precipitate when mixed. |
| (c) | <ul style="list-style-type: none">The colorless solutions produced a white precipitate when mixed. |
| (d) | <ul style="list-style-type: none">The silvery solid added to the colorless solution produced gas bubbles and a green solution.The gas produced a pop sound when ignited. |
| (e) | <ul style="list-style-type: none">The colorless sodium hydroxide and green chromium(III) chloride solutions produced a dark precipitate and a colorless solution. |
| (f) | <ul style="list-style-type: none">The soft, silvery solid and colorless liquid produced gas bubbles and a colorless solution.The gas produced a pop sound when ignited.Red litmus turned blue in the final solution.The final solution produced a bright red flame color. |
| (g) | <ul style="list-style-type: none">The silvery solid and colorless solution produced a pink solution and silvery needles. |
| (h) | <ul style="list-style-type: none">The colorless solutions remained colorless when mixed.A vinegar odor was produced. |

UNIT 3/4

Directions:

Write balanced formula equations with states for problems (a) to (h) underneath the chemicals record the appropriate observations and *diagnostic tests*

* Use diagnostic test table, flame test & ion solution color